

One month later a large tubed pedicle 12 inches long and  $1\frac{3}{4}$  inches in diameter was made on the lower right abdomen. Three weeks later the flank end of the pedicle was severed from the abdomen and transplanted into the middle of the anterior surface of the right thigh. From thence it was transplanted to the calf of the left leg and then to the right ankle, as shown in Figure 1 (a).

Transplantations were done at intervals of three weeks. In the illustration the scar of the burn can be seen, also the eversion of the foot. The pedicle was finally transplanted entirely to the foot, the scar tissue excised completely and the pedicle spread out and sutured. Healing occurred normally and the patient returned to work two months after the final operation. He walked without limping, and had forty-degree plantar flexion and fifteen-degree dorsi flexion with approximately one-half of normal subastragaloid motion. The final result is shown in Fig. 1 (b).

1 1 1

CASE 2.—This patient was severely burned in a tunnel explosion and, among other injuries, sustained a deep burn of the extensor surface of the right arm from the elbow to the junction of the upper and middle thirds. The resulting scar limited flexion to 68 degrees, and even partial flexion caused severe pain in the region of the elbow joint. Fig. 2 (a) shows the scar and the first stage of the scar replacement by a tubed pedicle from the right flank. Fig. 2 (b) shows scar entirely replaced by the pedicle, and Fig. 2 (c) and Fig. 2 (d) show the final result with complete return to normal function. There was entire relief from pain.

1 1 1

CASE 3.—This patient was injured when an automobile in which he was riding overturned and he suffered the loss of the left auricle. Repair was done by the use of a small-tubed pedicle from the clavicular region, which admirably supplied the necessary type of tissue. The original condition, together with the first step up of the tubed pedicle, is shown in Fig. 3 (a). The next stage where the pedicle is sutured to the antihelix and blended into the remaining helix is shown in Fig. 3 (b). The final result is shown in Fig. 3 (c). Further uses of the small-tubed pedicle are shown in an article by the author on "Reconstruction of the External Ear," *Surgery, Gynecology and Obstetrics*, March 1930, pages 601-605.

1 1 1

CASE 4.—This patient was injured May 27, 1926, when a supposedly empty 110-gallon sulphuric acid drum exploded while he was cutting it with a torch. Goggles he was wearing protected his eyes, but he received second and third degrees burns of the face, nose, neck, and ears. He also suffered the loss of a leg. Subsequent healing was very slow and resulted in marked scarring of the face, with loss of most of the soft tissue of the nose. The nose was covered with a thin, red, shiny epithelium, and the tip and alae were practically destroyed. The scar over the bridge and sides of the nose was replaced with a Wolfe graft of full thickness skin, and the result of this operation is shown in Fig. 4 (a). Unfortunately the pictures of the original condition were not good, but these illustrations show well the damage to the tip and alae.

The problem of restoring the tip and alae was solved by the use of a Gillies type of tubed pedicle graft in a manner which, I believe, has not been used before. The tubed pedicle was made parallel to the clavicle, then transplanted upward to the nose in various stages as shown in Figs. 4 (b) and 4 (c). It was finally shaped as shown in Fig. 4 (d), giving a close approximation to the normal in contour and appearance.

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## SYPHILIS—THE TREATMENT OF WASSERMANN-FAST AND CEREBROSPINAL BY MODERN METHODS\*

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WASSERMANN-FAST SYPHILIS.—Paul Ehrlich in 1906<sup>1</sup> reasoned that protozoan diseases could not be treated by specific antitoxins, but must be treated by sterilizing the blood stream of the organisms. Attacking spirochetal diseases from this angle led to the discovery and development of salvarsan in 1910. In the course of his experiments, in treating trypanosomiasis with certain specific dyes, he found that if the dosage were too small to completely sterilize the animal of the parasites a race of trypanosomes could be bred which proved permanently fast or resistant to the effects of the drug. Later experiments<sup>1</sup> proved that the same thing will happen in the course of treating acute syphilis, and thus we have cases which are Wassermann-fast.<sup>13</sup>

### INTRAVENOUS BISMUTH

Intravenous bismuth was first introduced by Grenet, Drouin, and Richon<sup>16</sup> in 1922, and has many advantages over preparations for intramuscular injections.

The dangers of its use, according to Ritter and Karrenburger,<sup>17</sup> are: (a) shock; (b) yellow atrophy of the liver; (c) weakened serum reactions. If used with caution, however, no untoward results may be expected.

### INTRAVENOUS IODIN

After a thorough search of American literature the only reference to the use of intravenous iodine appears in the *Journal of Experimental Medicine*,<sup>3</sup> March 1930, as follows:

A new medicine in the treatment of syphilis has entered the field in the form of soluble iodine (Burnham's) for intravenous use. However, it is so new that no authentic data can be given as to its therapeutic value.

M. Biach<sup>4</sup> of Vienna states that syphilitics tolerate iodine practically in all instances, even when given intravenously in large doses. In its distribution in the various tissues, the heart, liver, and spleen contain approximately the same percentage of iodine, while the average content in the blood is about six times as high. More is deposited in the suprarenals and ovaries, but most in the thyroid gland. When iodine is introduced into the system, thyroid function is frequently stimulated.

### TRYPARSAMID

Tryparsamid has proven to be one of the most useful drugs in the treatment of neurosyphilis and has a wide range of possibilities. Its im-

\*Read before the Butte County Medical Society, Oroville, September 23, 1930 (by invitation), by Lieutenant-Commander James E. Potter, Medical Corps, U. S. Navy.

\*Read before the San Francisco County Medical Society, San Francisco, January 6, 1931 (by invitation).

mediate administration, if given slowly, is not followed by any form of reaction. Its principal virtue lies in the fact that following intravenous injection, arsenic appears in the spinal fluid (Fordyce and Myers<sup>15</sup>). However, one should make haste slowly in the use of tryparsamid. Wood and Moore,<sup>5,2</sup> Solomon and Viets, Pearce and Lillie,<sup>6</sup> have all reported severe visual disturbances following intravenous injections of this drug. An analysis<sup>7,2</sup> of 1254 cases of neurosyphilis treated with tryparsamid showed that two per cent had permanent visual damage. It is presumed that tryparsamid affects the optic nerve by way of the subvaginal space. As a spirocheticide it is decidedly inferior to neoarsphenamin.

#### ELEVATION OF BODY TEMPERATURE

Practically every one of the self-limiting pathological conditions is accompanied by a rise in the body temperature. This condition may be either a manifestation of the process of cure, or it may be only a reaction of the tissues as a result of infection. It is worthy of note that in certain classes of pathologic conditions that ordinarily are not self-limiting the rise of temperature occurs only in the terminal stages. The realization of this fact led to the introduction of toxic substances into the body which would create an elevation of temperature. Other modalities, such as baths and electricity, have been used in this connection.

Wagner Von Jauregg<sup>8</sup> first reported the use of malaria in the treatment of general paresis in 1917. It is still much more popular in European than in American clinics. Many adverse reports can be found in the literature. Gonzalo R. Lafora<sup>9</sup> of Madrid (1930) states that mental disturbances following malaria therapy of general paralysis have varying aspects. During the febrile attack, delirium, hallucinations, and paranoid or catatonic conditions are seen. Such reactions are also seen after the fever has subsided. Hallucinations and the paranoid forms would seem apt to follow malarial treatment. In purely tabetic cases, multiple sclerosis, postencephalitic Parkinson syndrome, and epilepsy, these conditions are not so marked; indicating that they depend largely on the diffuse cerebral paralysis and taboparalytic processes, to which the toxoinfection of malaria is added. Malaria treatment has been used with caution by surgeons of the United States Navy. Stephenson and Love<sup>10</sup> have reported favorable clinical results following its use. They conclude that elevation of temperature is responsible for the improvement in clinical manifestations. However, the question arises as to the advisability of superimposing one debilitating disease upon another and expecting no deleterious sequelae.

Carpenter and Boak,<sup>11</sup> in the *American Journal of Syphilis*, describe an apparatus and method of heating animals by short radio waves. Twenty-one of a group of twenty-five rabbits infected intratesticularly with *Treponema pallidum* and heated as described in the technique given, failed to develop chancres when treatments were begun

four, five, and seven days after injection. Five of these twenty-one rabbits developed nodules in their testes during the treatment, but by intensifying the exposure the lesions disappeared. One treated rabbit developed a chancre, while the testes of the second became enlarged, edematous and indurated. By increasing the duration of the heatings they became normal. One rabbit died from overheating and one died from intercurrent infection. Eighteen of twenty controlled rabbits similarly infected developed typical lesions of experimental syphilis; two died three days after infection, of peritonitis.

In March 1930, therapeutic fever produced by diathermy and high frequency currents was introduced by King and Cocke.<sup>12</sup> With special reference to its application in the treatment of general paralysis, the method used by King and Cocke has been followed very closely by us.

#### TREATMENT OF WASSERMANN-FAST CASES

A careful history of the patient's previous medication is taken. Following Ehrlich's<sup>13</sup> observations of the cause of Wassermann-fast cases, naturally a spirocheticide which has not previously been used is selected. Usually all cases will give a history of having had an intensive course of arsenical treatment. For instance, if neoarsphenamin and mercury have been employed, our drugs of choice would be intravenous bismuth and iodine. The following routine has been adopted, which has given excellent results: Three injections of one gram sodium thiosulphate are given intravenously at twenty-four hour intervals. This drug is used in an attempt to dislodge or absorb any arsenic that may be stored, and prepare the system to receive the attack against the spirochetes from a different angle. Nonmetallic sulphur in the form of sodium thiosulphate<sup>14</sup> precipitates the whole group of metals, *i. e.*, arsenic, lead, mercury, zinc, copper, and bismuth. In doses up to two grams intravenously the chemical action is rapid, converting metals into insoluble sulphids which are nontoxic.

#### DIATHERMY

After a thorough preparation, the patient receives five cubic centimeters of Loesser's intravenous bismuth, which is followed by a diathermy treatment\* described below:

A rubber sheet, approximately four by seven feet, and having a rubber tube vulcanized in its center, is placed on an ordinary hospital bed (no other insulation is needed). The tube is led to a bottle placed beneath the bed as a drain for perspiration. The patient is stripped, placed on the rubber sheet, and two electrodes (eight by fourteen inches with one side insulated with one-fourth inch sponge rubber) are placed under the buttocks and shoulder blades. Two similar electrodes are placed over the abdomen and chest. The two lower electrodes are connected to one

\* Through the courtesy of the manufacturers and distributors of physiotherapy products, the writer had the use of six diathermy machines for a period of four months.

lead of a high frequency diathermy machine and the two upper electrodes are attached to the other lead. A rubber sheet and two heavy blankets are then placed over the patient and tucked in snugly, leaving only the face exposed. The current is turned on with the milliamperage reading at 2000 and gradually increased until the reading reaches 4500 to 5000 milliamperes.

Temperature and pulse rate are taken every fifteen minutes. It usually requires about one hour, with a gradual increase, before it is safe to expose the patient to such a high frequency. Generally, after the lapse of an hour and one-half to two hours, the patient has attained a temperature of 102 to 103 degrees Fahrenheit. Irritable subjects are given a hypodermic of one-quarter grain of morphin sulphate early in the procedure. This is generally conducive to drowsiness and sleep.

For the sake of safety, the pulse rate should not be allowed to exceed 130 beats to a minute. Any irregularity of the pulse, air hunger, extreme nervousness, sudden dilatation of the pupils, and absence of sweating, are the first signs of danger. Blood pressure readings are inconvenient to make and are unnecessary because the other symptoms will always precede an alarming fall in blood pressure.

In treating Wassermann-fast cases we rarely create a therapeutic temperature higher than 103 degrees Fahrenheit, and usually limit them to two-hour intervals of diathermy exposure.

Forty-eight hours later, ten cubic centimeters of Burnham's intravenous iodine is given, which is also followed by a diathermy treatment. The first course consists of ten or twelve of the above alternating treatments, according to the capacity of the patient to assimilate the bismuth, iodine, and diathermy treatments, respectively. Serological readings at the end of this treatment always shows a decided improvement.

#### CEREBROSPINAL AND NEUROSYPHILIS

So much has been written and the disease has been attacked from so many angles that it would be impractical to quote a consensus of opinion. Therapy becomes a distinctly different problem during later stages of the infection, when spirochetes have been localized in parts of the body that are therapeutically inaccessible to the ordinary spirocheticidal agent. When the factor of resistance comes into play and the course of the disease is determined largely by the resistance of the individual, therapeutic fever is of proven value. Treatment becomes a question of reaching inaccessible foci of infection, and this might be done either by the use of spirocheticidal agents or by the use of agents whose primary function is to reinforce the resistance of the patient, or, better still, by the use of substances that combine both of these qualities of action.

After many experiments with various drugs and methods, the following routine has been adopted:

A careful physical examination is made, including blood and spinal Kahn tests, cell count, colloidal gold curve, globulin, blood pressure, and an attempt to estimate the physical resistance of the patient. The field of vision of each patient is taken and recorded. The patient is then given three grams of tryparsamid intravenously and then diathermy treatment is administered as described above, except that the therapeutic temperature is elevated to 104 degrees Fahrenheit and kept there for a period of two hours, which makes the treatment continue from three and one-half to four hours. Forty-eight hours later, five cubic centimeters of Loesser's bismuth is given intravenously, which is followed by another therapeutic fever treatment. Forty-eight hours later, ten cubic centimeters of Burnham's iodine is injected intravenously, which is also followed by a therapeutic fever treatment. This same routine is continued for four weeks or longer, unless contraindicated. The field of vision test is made prior to each injection of tryparsamid. If there is an indication of a contraction of the field of vision, tryparsamid should be discontinued. Any simple clinical test for the field of vision will suffice and tryparsamid can be discontinued before permanent damage has resulted.

#### RESULTS OF TREATMENT

A total of ninety-three patients were treated, twenty of which gave a positive spinal Kahn test and are classed as cerebrospinal; the remaining seventy-three were Wassermann- or Kahn-fast cases.

Seventy-three patients were treated (Wassermann-fast). Thirty-three gave a four plus serum reaction before treatment was started, and twenty of these gave a negative Kahn blood and spinal after the treatment was completed. The remaining thirteen gave a two plus Kahn after receiving the average number of treatments. Twenty-nine patients showed a three plus Kahn before treatment started, and a negative Kahn blood and spinal after the treatment was completed. Eleven patients showed a two plus blood Kahn before the treatment was started, and the blood Kahn was negative after treatment was completed.

Of the twenty cerebrospinal patients treated, one had a severe ocular disturbance and did not complete the treatment. Five exhibited mild visual disturbances, but not of sufficient severity to warrant discontinuing tryparsamid treatment. The only clinical manifestation of the cerebrospinal patients was a contraction of the field of vision without any apparent damage to the optic nerve. One of this series is a semi-invalid (treatment started after the development of hemi-

TABLE 1.—Treatment Chart

Type of Case	Blood Kahn		Spinal Fluid Kahn		Pandy's Test		Cell Count		Number of Treatments				Results	
	Before Treat.	After Treat.	Before Treat.	After Treat.	Before Treat.	After Treat.	Before Treat.	After Treat.	Therapeutic Fever	Tryparsamid	Iodin	Bismuth	Clinical Manifestations	Visual Disturbances
Cerebro-spinal Syphilis Case Numbers	2 plus	Neg.	4 plus	Negative	4 plus	1 plus	65	10	15	7	8	6	D. A., S. I.	Mild
	Neg.	Neg.	2 plus	Negative	2 plus	Neg.	22	7	12	6	9	8	D. A., S. I.	None
	3 plus	Neg.	4 plus	Negative	4 plus	1 plus	72	15	14	7	8	9	Some Imp.	None
	2 plus	Neg.	3 plus	1 plus	4 plus	1 plus	32	11	11	7	10	8	D. A., S. I.	Mild
	Neg.	Neg.	4 plus	Negative	4 plus	2 plus	48	20	16	8	7	8	Some Imp.	Mild
	Neg.	Neg.	3 plus	Negative	2 plus	Neg.	16	9	12	6	8	8	Some Imp.	Mild
	4 plus	Neg.	4 plus	1 plus	4 plus	1 plus	50	15	16	8	10	8	Much Imp.	None
	Neg.	Neg.	2 plus	Negative	2 plus	1 plus	16	7	8	4	7	8	D. A., S. I.	None
	3 plus	1 plus	3 plus	2 plus	2 plus	1 plus	19	5	10	5	9	8	Some Imp.	None
	2 plus	Neg.	2 plus	Negative	1 plus	Neg.	10	5	16	8	8	10	D. A., S. I.	None
	2 plus	Not made	4 plus	Negative	3 plus	Not made	22	Not made	5	3	2	2	Did not finish	Severe
	Neg.	Neg.	4 plus	1 plus	4 plus	Neg.	36	7	15	3	7	7	Some Imp.	None
	Neg.	Neg.	2 plus	Negative	3 plus	Neg.	20	5	15	9	15	7	Some Imp.	Mild
	3 plus	Neg.	4 plus	1 plus	4 plus	1 plus	60	10	16	9	15	12	Some Imp.	None
	2 plus	Neg.	3 plus	Negative	3 plus	Neg.	30	5	14	8	7	9	D. A., S. I.	None
	2 plus	Neg.	2 plus	Negative	4 plus	Neg.	42	15	18	10	9	9	D. A., S. I.	None
	4 plus	Neg.	3 plus	Negative	3 plus	2 plus	65	25	17	11	10	8	Some Imp.	Mild
	3 plus	Neg.	2 plus	Negative	4 plus	1 plus	32	10	15	12	9	15	Some Imp.	None
	2 plus	Neg.	3 plus	Negative	3 plus	Neg.	20	5	8	12	8	9	D. A., S. I.	None
	1 plus	Neg.	2 plus	1 plus	4 plus	2 plus	19	7	10	10	7	11	Some Imp.	None
Kahn Fast Cases														
Case Numbers	4 plus	Neg.	Negative		Neg.		5		12		16	14	Much Imp.	
	3 plus	2 plus	Negative				6-7		12		16	14	Much Imp.	
	3 plus	Neg.			Neg.		Av. 7		Av. 14		Av. 18	Av. 16	Much Imp.	
	2 plus	Neg.							Av. 11		Av. 16		Much Imp.	

Under Clinical Manifestations use: D. A., Disease Arrested; I, Improved; N. I., Not Improved; S. I., Slight Improvement; and Dis. Discontinued.  
 Under Visual Disturbances use: Some, None or Mild as the case may require.  
 Note: Kahn positive spinal cases are classified as cerebrospinal Syphilis.

plegia, motor asphasia, and mental disturbances); there has been a remarkable improvement in his general health, as well as his mental activity and optimistic attitude. His colloidal gold curve has changed from tabetic to a luetic. He is able to walk, dress himself, and come unassisted to the naval station for his treatments. In twelve patients the disease has apparently been arrested and they have resumed their former occupations and earning capacity. All patients treated were ambulatory. It has not been necessary to hospitalize any patient as a result of treatment. Two patients have been discharged from the naval service and no further observations were available.

This series may seem comparatively small. However, each patient referred to represents a special case in which the ordinary methods of treatment had not proven satisfactory. The improvement in clinical manifestations and serological reactions, together with the change from a pessimistic to an optimistic mental attitude, is typical of every patient who completed a full course of treatment. Having had an unusual opportunity to study syphilis in many of its phases, the writer has never used, nor observed, a method so uniformly satisfactory in the treatment of tertiary lues.

#### CONCLUSIONS

1. If given slowly, with a small bore needle, bismuth and iodine can be administered intravenously with safety.

2. Tryparsamid can be administered with safety if frequent ocular examinations are made. Its

selective action on nervous tissues renders it more useful in the treatment of cerebrospinal syphilis than other arsenical preparations.

3. Wassermann-fast patients which have been resistant to the usual methods of treatment have shown a marked improvement under the combined treatment of intravenous bismuth and iodine, in conjunction with diathermy.

4. Therapeutic fever created by diathermy is considered superior to malaria treatment in that the fever can be controlled. No serious sequelae have followed its use in selected cases.

5. The combined treatment of tryparsamid, iodine and bismuth intravenously, in conjunction with therapeutic fever created by diathermy, has produced remarkable results. Physical improvement and mental activity have given these patients an optimistic outlook on life and has helped to transform them from potential public charges to useful citizens.

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## VISUAL REQUIREMENTS FOR AUTOMOBILE DRIVERS

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THE ever-increasing number of automobile accidents in this country and others has attracted the attention of workers in all fields who have studied the problem with the hope of being able to offer suggestions for its reduction. Among those responsible for the regulations affecting automobile drivers should be the oculists, as good vision is a particularly necessary quality for the proper conduction of a motor-driven vehicle.

While it is true that factors such as fatigue, the emotional make-up of an individual, his state of mind, and the condition of the weather are of great importance in the causation of accidents, it would seem that under otherwise similar conditions a person with good vision would be less likely to have an accident than one not possessing it. Of course, the argument has been advanced that a person who is afflicted with poor vision is made more cautious by the knowledge of his shortcomings, but we who practice medicine and who too often see people eat food which they know will make them ill, are not tempted to believe that the care exercised by an unfit driver would offset the danger caused by the defect. To most oculists the obvious conclusion is that regulation of automobile drivers with regard to their visual acuity would be desirable, but the manner in which to determine this is difficult to decide. Germany and certain other countries have a compulsory medical examination, which would have to be repeated every few years, and therefore would hardly be practicable in this country on account of the great number of drivers.

#### REPLIES TO A STATE QUESTIONNAIRE

A letter was sent to each state motor vehicle department this year by the writer to ascertain just what steps had already been taken to work out this problem in the United States. Answers were received from forty-five states. Of this number the following thirty-three had no visual requirements for nonprofessional drivers: Arizona, Arkansas, Colorado, Florida, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Mexico, Ohio, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, South Dakota, Tennessee, Utah, Virginia, Washington, Wisconsin, and Wyoming.

*Visual Acuity.*—The state of Delaware has the most stringent requirement of a visual acuity of 20/30 in both eyes, or 20/20 in one eye. Vermont and Pennsylvania both demand 20/70 with both eyes, while Connecticut asks 20/70 in each eye, and Rhode Island 20/70 in one eye. New Jersey requires 20/50 in each eye, while California only requires 20/50 with both eyes. The attempt